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August 21, 1984

Separates

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Particles and Fields-Ionosphere

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tabridge, MA 02101
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95-19 ionospheric disturbances
ELECTRIC CURRENTS ABOVE SAINT-SANTIN 3. A
PREDMINARY STUDY of disturbances, JUNE 5, 1975 I
MARCH 22, 23, 1975,
C. Massadler, [Centre de Recherches en Physiquo do
Fäntironnement, 4 Arenne de Neptone, 94 100 Saint-Maur,

Fauncel
This paper presents a preliminary work on ionospheric electric coreasi sheurbances derived from the mossurement of

electric cursant inhurbances derived from the unasurement of the Saint-Santin incoherent Scatter radar.

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In this paper three cases of lonespheric electric current disturbances are eludied. The first of these, on June b, 1978 lituatates the sole influence of the machanism of direct penetralion of magnetospheric convection electric field generated by the solar wind/magnetosphero dynamo. The second case on March 22, 1979 is the first day of a storm the slectric current disturbance observed on this day is similar to the one

current disturbence observed on like day is similar to the one observed on June b, 1978, but it occurs when the thermospheric

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STRAITFURD HEBUSH — APPLICATIONS TO SOMOSFREED
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Yesn-Woel Kieng (Department of Siettrical and Computer Regineering, University of Illianis at Urbana—
Chanpaign, Urbana, Ullinote, bis01), C. H. Liu

Flana wave scattering by an irregularity sinh embedded in a lineerly ettatified heart-origing of the etudied under alogia cratter epproximation. In addition to regular reliaction from the stratified herb-ground, both the incident add the raffected waves ate scattered by the random irregularities. The behavior of the unparterbed field in the meighborhood of the turning point ts accurately taken into account by using the luis save solution. The ecattered Heids can be interpreted in terms of the Bragg condition stailer to the case of the well-known Bookar-Cocdon lors, but with four terms accounting for the reflection offect of the turning point as both the unperturned and scattered waves. The case of clangated irregularities is studied in detail. Analytical expression for the angular spacetom of the everage exattered lield intensity is derived and its physical meaning discussed. In comparison with the case where the background sadion is, homogeneous, the relation to the twa-diaman lond. Bookar-Cardon forpwale is electified. Applications to the 15 propagation in the distance of Real Sci., Paper 450911

35NO wave propagation
FIRST OBSERVATIONS OF 140 MEZ PLASMA-LINE BACKSCATTER
DUPING HEATING EXPERIMENTS AT TROUSE
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Uppsele, Sweden B. Thide: K. Boatron, R. Darblon;
S. Kopke and P. Stubbe



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Yews

Reviewing NASA Research

A recent report by NASA's Space and Earth Science Advisory Committee cautions against assigning the space agency's research and analysis efforts a lower priority than flight operations. If pre- and post-mission science continue to take a back seat to the actual building and launching of spacecraft, the report warns, it may eventually compromise NASA's ability to ensure U.S. leadership in space science.

The report was written by a working group consisting of both NASA personnel and earth and space scientists from the academic conmunity. The group was asked in May 1983 to examine the health of the research and analysis (R & A) program conducted by NASA's Office of Space Science and Applications (OSSA) in the earth and space sciences. While the group found that the quality of research management by scientists at NASA Headquarters was "impressive," it also identified a critical shortage of cash for R & A programs. According to the report, "the immediate requirements involve an increase of about \$10 million in each of the Astrophysics, Earth Science and Applications, and Solar System Exploration divisions, thereby establishing a new base funding level for these activities."

Part of the problem with inadequate R & A funding arises when projects such as Viking and Voyager are perceived to be ended as soon as the spacecraft reach their destinations. After the Viking spacecraft landed on Mars in 1976, for example, funding for the project declined sharply, even though important scientific data were still being returned well into the 1980's. With little NASA money available for data reduction, the privately operated Viking Fund resorted to passing the hat in order to keep a limited Viking data analysis program going.

The comminee's report emphasizes that data analysis, synthesis, and interpretation are an important part of any healthy R & A program. Specifically, the report recommends that "OSSA should, in consultation with the scientific cummunity with which it collaborates, develop an overall plan for data management, computation, and communications that is broad enough to serve the various OSSA scientific endeavors."

Another important aspect of R & A that needs beefing up, according to the report, is basic research into new spacecraft detectur and instrument technology, which must be maintained fur NASA to confluct state-of-the art science. Laboratory and experimental equipment used by NASA-sponsored researchers has also l'alten into disrepair or become outmoded while limited funds have been spent elsewhere, according to the report, to the point where "many Europenn and Japanese laboratories are equipped with instrumentation far superior 10 our own. It is important to the country's lnng-tenn technoogical well-being and to NASA's fature in particular that this situation in universities be

Special IGR-B Issue: Mapping the Seafloor

JGR-B will publish a special issue in 1985 focusing on the results obtained by using a variety of new seafloor mapping lools (e.g., SEA BEAM, SEA MARC I and II.GLORIA, GEOS 3, and Seasat radar a timetry). Liberal use of color and large-format black and white figures is encour aged. Special reduced rates for color will apply. Papers describing results obtained ig these new techniques in a variet of tectonic environments (e.g., mid-occan ridges, active margins, passive margins, seamounts) are solicited as well as papers describing instrumentation and data proc essing and interpretation techniques. Submission deadline is September 30, 1984. Publication is planned for July or August 1985. For further information rontact Gerald Schubert, Editor of IGR-B, or Robert Detrick, Associate Editor for this

Cerald Schubert, Editor Journal of Geophysical Research
Department of Earth and Space Sci-

University of California Los Angeles, CA 90024 (telephone: 218-825-4577 or 824-5665)

Robert S. Detrick Graduate School of Oceanography Narragansett Bay Campus University of Rhode Island Kingston, RI 02881

With regard to NASA-funded theoretical and predictive modeling work, which hoth help to shape mission designs and benefits mends that NASA enrourage more "interdis-

ciplinary collaborations and activities such as small workshops that foster new ideas and cross fertilization." In addition, a certain amount of R & A money should be set aside for "high-risk" research ventures in order to encourage fresh ideas and innovation. The committee believes that NASA researchers should continue to receive muhi-year funding so as to not be swamped with paperwork during one short contract year, and that NASA and non-NASA proposals should continue to be judged by the same standards of peer review. The balance between work performed by university, NASA field center, and other laboratory researchers was found to be good overall, with the exception of "a few discli-

from their results, the rommittee recoin-

pine areas, such as Land Processes, where particular attention neils to be paid to increasing the breadth of university participa-While the report points out that a few R & A programs within OSSA appear to be ade-

quately funded (upper atmosphere research is cited as an example), others, such as solar system exploration and climate research, would henefit from 20 to 30% increases in R & A funding. An infusion of \$10 million to the solar system exploration program, for example, would not only allow laboratury equipment to be apprached but would provide enough money for enhanced Halley observations and data reduction, more extensive U.S. participation in foreign missions, and support for Mars and Voyager Uranus data analysis. t would also allow a start on a "Planetary Data System Program permitting easy access for many scientists to the treasury of planetary data that has been accumulated from past missions." Similarly, additional funds for the earth sciences would mean more efficient use of microwave and Landsat Thematic

Finally, the committee calls for a stable R & A bridget even in times when no spacecraft are being launched, so that there can be a continuous cycle of scientilic input and untinit from the actual missions. As the report states, "the missions are the means by which OSSA compibutes to progress in the space and earth sciences; they are not in themselves an objective.

Probable Maximum Flood

A Federal Interagency Work Group on Probable Maximum Flood Assessment is currently studying the problem of hydrologic de-sign based on the probable maximum flood (PMF). Of particular interest are the calculation of PMF probabilities, the accuracy of such estimates, and the development of a standardized methodology for probabilistic assessment of severe floods.

In an effort to establish the state-of-the-art. the work group is interested in obtaining copies of papers or reports that are related to the subject. Please send relevant material to Richard H. McChen, Department of Civil Engineering. University of Maryland, College Park, MD 20742.

Upcoming Hearings in Congress

Congress returns on September 5 from its recess for the Republican National Convention and the August district work period. Expect rapid changes in schedule during the next several weeks as the election approaches.

The following hearings, markups, and con-ference committees have been tentatively scheduled for the coming weeks by the Senand times have yet to be announced; the committee, subcommittee, or conference committee holding the hearing, markup, or conference will be setding schedules in the next few days. All offices on Capitol Hill may be reached by telephoning 202-224-3121. For guidelines on contacting a member of Con-

gress, sec AGU's Guide to Legislative Information and Contacts (Eas, August 28, 1984, p. 675). TBA1 Markup of Safe Drinking Water Act (P.L. 93-523) amendments (H.R. 5959) by

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8eginning in 1985

Reviews of Geophysics and Space Physics will be titled Reviews of Geophysics. Approximately 800 pages to be published in Volume 23, 1985:

the Health and the Environment Subcommittee of the House Energy and Commerce

TBA: Hearing on nuclear waste program anning by the Energy and the Environment Subcrimmittee of the House Energy and Commerce Committee

TBA: Mark op of legislation (H.R. 4589) that would require federal Coastat Zone Management plans in be consistent with state management plans by the House Merchant

TBA: Conference on the Export Adminis

TBA: Conference on legislation (S. 1097) to consolidate certain programs on satellites and the atmosphere within the National Oce-anic and Atmospheric Administration.—BTR

David E. Dunn, Dean of the College of Sciences at the University of New Orleans, will become Dean of Natural Sciences and Mathematics at the University of Texas at Dalkis ou

James Hughes was presented with a plaque at the recent 7th International Conference of Atmospheric Electricity by recognition of his discerning and perceptive support of atmo-spheric electrical studies on a global scale. Throughout his career at the Office of Naval Research, Hughes has been instrumental in promiting basic research that has provided new insights into various phenomena, such as formation of lightning in thunderclouds and volcanic emptions, the production of atmospheric ions, and the role played by ocean spray particles in the formation of raindrops.

deceased

Erust J. Dpik, III. An AGU Life Fellow and a member of the Planetology Section, he

Geophysical Events

Thus is a summart of SEAN Bulletin, 917), July 31, 1984, a publication of the Simthsonian Institution's ly issues mailed to a U.S. address, \$28 if mailed else-

Volcanic Events

Kilauca (Hawaii): Phases 22-23 of 1983-

1984 E Rift Zone eruption.

Mount St. Helens (Washington): Deformintion, seismicity, and SOs emission drop. Arenal (Costa Rica): Lava production slows

Rabaul (New Britain): Seismicity declines: deformation increases.

Manam (Bismarck Sea): Strombolian activity; frequent debris avalanches.

explosions from central and NF craters. Atmospheric effects: El Chichón aerosuls

Elna Volcano, Sicily, Italy (37.73°N.

The quoted material is a report frum Romolo Romano. "The southeast crater eruption that began

more or less intense strombolian activity, ac-

Marine and Fisheries Committee. tration Act reauthorization (S. 979).

Geophysicists

joined AGU in 1961.

The following AGU members are recently

John D. Isaacs, 70, An AGU Life Fellow and a member of the Ocean Sciences Section, he joined AGU in 1950. Robert C. Miller, 85, died June 11, 1984.

An AGU Life Fellow, he joined AGU in

Scientific From Alert Network. The complete bulle-tin is available in the microfiche edution of Eor to a tin is available in the microfiche edulion of Eos. of microfiche supplement or as a paper reprint. For the microfiche, order document E81–008 at \$2.50 (U.S.) from AGU Fulfillment, 2000 Florida Avenuc, N.W., Washington, DC 20009. For the paper reprint, order SEAN Bulletin (giving volume and issue numbers and issue date) through AGU Separates at the above address; the price is \$3.50 for one copy of each issue number for those who do not have a temporal account. \$2 for those who do: additional post account, \$2 for those who do; additional copies of each issue number are \$1. Subscriptions to SEAN Bulletin are svailable from AGU Folitiment at the above address; the price is \$18 for 12 month-

as strong tephra ejection begins. Llaima (Chile): Dense columns of dark ash

emitted from crater.

Home Reef (Tonga): Large pumice rafts in Fijl area from March eruption. Etna (Italy): Lava production and strombo-

persist in stratosphere.

15.00°E). All times are local (= UT + 2 hourst.

April 27 was rontiming in early August with companied at Irregular intervals by violent expulsions of dark ash. This activity pro-duced a scorla cone (about 50 m high) higher than the rim of the southeast crater. The ef-

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1 week

Insive activity took place from yents around 3000 in above sea level that changed their poshirms continuously. On August 6, two ellusive vents were active along the old rim of the southeast crater, one on the NE edge, the other on the southern edge. Some rather well-fed flows originated from these years. The final flow direction was always E, toward the Valle del Bore. During this period, the lava flows never advanced below 2600 m. The lara field that formed from this coming ous and variable tin terms of intensity and position) effusive activity was larger than 1 km in extent. The volume of lava emitted can be estimated at around 8-10 s 106 m³.

"An increase in central cratter eruptive acdvity was recurded in Inly. From the west vent (Bocca Nuova), violem expulsions of gray ash continued at teregular intervals. while on the floor of the vern, violent and continuous strombolian activity continued. At dmes, incandescent lava rose higher than the crater rim. The larger east vent (The Chasnit of the central crater, after showing activity similar to that as Bocca Nuova in mid-July. was the source of violent activity on July 19 between 1800 and 1700. Very violent stronbolian activity ejected incandescent lava Travments about 1 m in cliameter to 500 m from the crater rim. The southern and northern flanks of the central crater were most often impacted by the lava fragments (their arerage diameter was about 30 m, and they fell within an average radius of 300 m)."

The pilot of an aircraft flying near Etna at 1542 on July 19 observed an emption cloud that reached about 6.5 km altitude. At 1613, the NOAA 7 polar orbiting satellite showed a plume extending 100 km cast from Etna.

"After this, The Chasm remained obstruct-

ed until August 1, when it reopened (at 1900) with the expulsion of old material that fell outside the crater rim. On August 6, this vent was once again obstructed (around 1300) as the result of internal landslides.

"The northeast crater, luactive since February 1981, had a violent explosion that ejected old material on July 20 at 1715. Since then, strong emissions of vapor and gases occurred from the small vent that formed near the sumink."

Information Contacts: Romole Renymu, Isthuto Internazionale di Vulcanologia, Viale Regina Margherita 6, 95123 Catania, Italy; Michael Mnison, NOAA/NESDIS, Roum 510, World Weather Building, Washington, DC 20233.

Meteoritic Events

Fireballs: W Australia (two); N California, Oregon (twu).

Earthquakes

Date	Time, UT	Magnitude	Latitude	Lungitude	Depth of Focus	Region
July 5	0522	6.5 Ms	6.09°S	154.42°E	30 km	Solumon Islands
July 19	0656	4.9 mb Lg	52.91°N	4.20°W	20 km	United Kingdom

Information Contacts: Nadmod Earthquake Information Service, U.S. Geological Survey, Stop 967, Denyer Federal Center, Box 25046, Denver, CO 80225.

The Oceanography Report



The focal point for physical, chemical, geological, and biological oceanographers.

Editor: David A. Brooks, Department of Oceanography, Texas A&M University, College Sto-tion, TX 77843 (relephone: :100-8:15-5327).

Donde Va? An Oceanographic Experiment in the Alboran Sea

The Donde Va Group!

Introduction

Profession of

During June-October 1982 an international consortium of oceanographers studied the circulation of the western Alboran Sca in an experiment entitled "Doucle Val." Although the English translation of this title is "Where does it go?," our goals were more ambitions than the mante implies. In this overview of Donde Va? we will discuss the oceanugraphic background of the region, the objective of the experiment, and the preliminary results.

Oceanographic Background

The Alboran Sea is the westerminist of the many basins that comprise the Mediterranean Sea. A narraw (10-30 km) current of Adantic water (fresher than 36.5 salinity) flows eastward through the Strait of Gibraliar with a volume transport of about 1.4 x 106 m/s, while saline Mediterranean water (38.4 salinity) flows westivard beneath it with a transport

that is about 4% less. This two-layer flow maintains the salt and water halance of the Mediterranean which annually loses about 1 ni over its surface through the excess of evaporation over river runoff and precipitation [Lacombe, 1984]. While intuition might lend one to anticipate that the Atlantic water entering the Mediterranean would be found along the Morticcan coast (i.e., turning to the right upon exiting the strait), in fact the inflow is found near Spain, where it forms the northern half of a basin-wide anticyclonic gyre [Lanoix, 1974; Cheney and Doblar, 1982; Parrilla and Kinder, 1984]. There have been several model studies of the gyre [Whitehead nad Miller, 1979; Naf. 1978; Preller and Hurlburt, 1982], and it is nearly always detectable In satellite infrared images [Phillips and Harnug, 1982].

를 ₁₀₀

Objectives

The primary objective of the experiment was to understand the dynamics and the variability of the unicyclonic gyre by using numerical modeling, remote sensing, and field measurements. Our hypothesis was that the Atlantic inflow is the primary forcing mechanism for the gyre, so that if we made synoptic nieasurements of the inflow and of the gyre, and compared these measurements to nu-merical model simulations, then we could increase our understanding of the gyre dynam-

The experiment addressed numerous sec-

ondary questions including

1. What is the structure of the Intermediate and Deep Water Hows, and how do these waters routiling to the Mediterranean out-

2. What is the biological and chemical influence on the gyre's strong ocean color sig-nal, and how is this signal related to the physical structure of the gyre? 3. How does the strong front along the

northern limb of the gyre affect the atmospheric marine boundary layer, and how does the marine boundary layer then affect remote 4. How are the surface signatures of the

gyre, as measured by satellite and aircraft sensors, related to the subsurface structure of 5. How dues atmospheric forcing influ-ence the gyre, both directly and through changes in the Atlantic inflow?

Preliminary Results

The experiment had three overlapping phases, all ending in late October 1982. The first phase began in October 1981 and con-

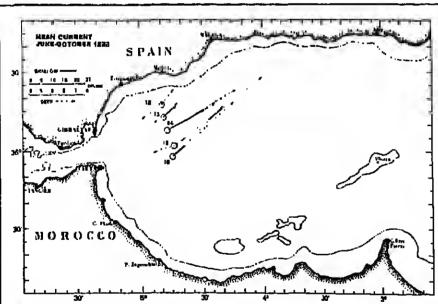


Fig. 1. Satirity at 100 dbar, showing the structure of the Atlantic inflow and gyre at depth.

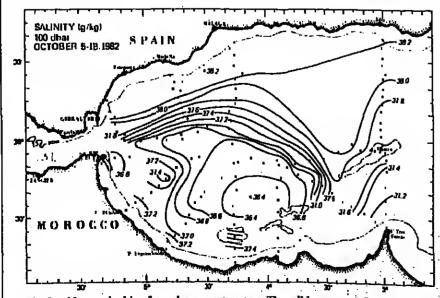
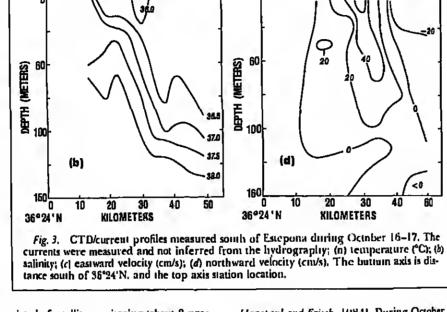


Fig. 2. Mean velocities from the current meters. The solid arrows are from instruments in the Atlantic hiflow or gyre, while die dashed arrows (note scale change) were in the low er part of the Medllerranean Intermediate water.



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sisted of satellite monitoring (about 2 proc-essed images per month) of the thermal surface leatures. The second phase began in June 1982, when five current meter moorings were deployed, a small hydrographic grid was occupied, and satellite image processing increased to about once weekly. During the final phase in October 1982, four ships occupied stations in the Alboran Sea, the Strait of Gibraltar, and the Gulf of Cadiz (the area of the Atlantic Ocean just west of the strait); four aircraft performed remote sensing and AXBT flights; a shore-based current mensuring radar (CODAR) operated; additional meteorological and aerosol data were collected; and all available NOAA 7 (advanced very high resolution radiometer, AVHRR) and NIMBUS 7 (coastal zone color scanner, CZCSI images were obtained. The meeting report from an October 1983 workshop conrains a detailed account of the experiment and some early results [Parrilla, 1984]. We will briefly discuss the preliminary results of the Intensive October 1982 phase.

The Structure of the Gyre and The Atlantic Inflow

During October 1982 the gyre was fully developed, filling most of the western Alboran Sea. Figure I shows the salinity at 100 dbar. based on data taken over 2 weeks from twu ships. The deep part of the inflowing current can be inferred from the closely packed isohalines in the northwest, and the gyre as the low salinity (<37) water centered near 35°30'N, 4°00'W. This depiction of the saliniy distribution is probably close to the mean for the period, but the gyre displayed considerable variability during these 2 weeks. Satellite infrared images (see cover) showed large surface temperature changes, and three syn-optic aircraft AXBT surveys showed that the thermal renter of the gyre at 100 m moved

30 km within 10 days.

Near the Strait of Gibraltar, geostrophic estimates of the Atlantic inflow relative to 200 dbar were about 1.4 x 100 m s in transport, and maximum speeds were 140 cm/s. Hydrographic stations within 25 km of the Moroccan coast showed unexpectedly high gradi-ents, and currents computed from these data exceeded 100 em/s.

Current measurements also showed high speeds with strong variability in the gyre and the inflow. Five short-period (4-5 hour) surface measurements of sonobuoy drift tracks showed that the rore of the inflow was associated with a cool sea surface temperature and speeds of 120 cm/s. South of the Inflow, the speeds in the gyre averaged 60 cm/s, al-though some higher speeds were measured. Surface currents measured by radar (CO-DAR) over a region extending 60 km south

of Marbella (depending on interference and propagation conditions) were well correlated with geostrophic estimates and current meter data. CODAR measurements showed that the center of the inflow current had a width of 15-30 km, that it moved more than 30 km farther offshore in 4 days and that it had multiple velocity maxima of 5-15 km width

[Janopanl and Frisch, 1984]. During October, the current meters (Figure 2) slowed the subsurface vehicity cure shilting between mooring 14 and 15, with the highest speeds at the shallowest meters (depths of 67-124 m) exceeding 80 cm/s. The hest-resolved relocky section, taken with the CTTI Velocity profiler south of Estepain, revealed a current of about 25 km width, 100 m depth (20 cm/s isotach), and surface speeds of 120-140 cm/s (Figure 3). This section also showed that in the highest lurizontal shear regions of the current, large along-section relocities made the nonlinear terms in the momentum equations nearly as large as the Carialis term Generally, the genetrophic estimates appear valid, but details on scales of 10 km or less in the high shear regions may be inaccurate.

Optienl, Biological, and Chemical Measurements

Simultaneous measurements of visible and infrared radiation from both aircraft (umbispectral scanner and ocean color radiometer und satellite (CZCS and AVIIRR) sensors clearly pictured the gyre and the Atlanticiallow (Figure 4). The CZCS images were geometrically registered to a Mercator projection and armospherically corrected for quantita-tive chlorophyll concentration and for the diffuse attenuation coefficient. These results and the pircraft slata indicated that high cho rophyll concentrations were correlated with cool sea surface temperatures. Surface thermal from s were enjucident with ocean color fronts on the large scule, although differences appeared at smaller scules. Results of the CZCS showed suprisingly large daily change in chlorophyll concentration and attenuation coefficient across the entire sea. Along the northern from formed by the gyre and the Atlantic inflow, chlorophyll changed from 1.05 to 0.45 ing/nis and the attenuation coefficient from 0.15 to 0.07 within 24 hou The cause of these changes is still under setutiny. If the cause is either biological or physical, then the rapidity, areal extent and size of the changes will be a significant new result In situ optical and biological measurements

were concentrated along the mooring line (Figure 2). These measurements showed large temporal and spatial changes in the optical and thermal structure. Correlation with satellite images and other data showed that much of the temporal change was associated with variations in the structure of the Augotic inflow and gyre. Biological and nutrient concentrations also had a complicated and variable able structure. Phosphate concentrations were higher (0.3-0.7 µg at P-PO4) than was previ ously found, and some high nitrate concentrations also suggested that upwelling or mixing may have been supplying nutrients to the photic zone. High chlorophyli concentrations were associated with the high nitrate. Distoms were strongly dominant, with Rhizoplenia Stollerfothii the most abundant.

Submesoscale Thermal Features

Examination of the twice daily infrared inages (see cover) and visible CZCS Images (Fig. ure 4) revealed tongues of colder and more turbid water that were pointed toward the center of the gyre. They appeared first near the strait and their apparendy were advected around the gyre at a mean speed of 40 cm/s [La Violette, 1984]. These features had a horizonial dimension of 10-20 km (compared to the internal deformation radius of 15-30 km and a vertical extent, measured by ANBT sections, of at least 100 m. Salinity from a CTD cast obtained within one feature was in

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Cover. NOAA 7 advanced very high resolution radiometer (AVHRR) infrared images of the Alboran See collected as part of the Donde Va? experiment during Oc-tober 1982. The dot and V in the images show the advection of two submesoscale features about the Alboran Sca gyre (the line designates a key section near the cur rent moorings (cf. Figure 2 of TOR arti-cle, this issue). A close examination of the images shows that odier unmarked features were also being advected. Continuous monitoring of these cold-water features was possible because of the twicedady (about every 12 hours) spacing of the NOAA 7 overpasses. After registration to a mercator projection (accuracy : 1 km) and an atmospheric correction to arrive at absolute temperatures, analysis of the displacement of the cold water fea tures in successive images show their ap-parent origin east of Gibraltar, their aver age speeds of 40 cm/s around the gyre, and their apparent entradment into the Canic wate Illustration coursesy of The Donde Va Group, see TOR article, "Donde Va? An Oceanographic Experiment in the Alboran Sea," this issue.)

An Invitation Would you like to be on the cover of

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both aesthetie charm and acientific inter est-photographs (preferably black and white) of geophysical phenomena, experimental results, or graphs—Eos would like to consider them for publication on the cover. Send the original dilustration or 8 x 10 inch (20 x 25 cm) glossy photo with a short (50, 200 words) avalanceing that car short (50-200 words) explanation that can serve as a capdon. You may also submit a more extensive news Item or even a short article to acrompany a proposed cover. Captions will be by-lined. If the material has been previously published, please supply a copyright release from the copyright owner. Send It to East Cover, AGU, 2000 Florida Avenue, N.W., Washington, DC 20009. the range of Atlantic water. During 15 days of cloud-free satellite images, nine features could be tracked most of the way around the gyre. Because they appeared to originate near the strait about twice per day (the same frequency as the NOAA satellite passes), we ronjecture that the simng Strait of Gibraltar tides may influence their formation.

Meteorology and Aerosols

Shore stations and shipboard measure-ments, including soundings and aerosols, provided dense observation of the lower atmosphere. These data were obtained to eheck ilie influence of the atmosphere on the gyre [Cheney oud Doblnr, 1982; Bucca and Kinder, 1984] and on remote sensing measurements. The marine boundary layer was modified by cooling and warming due to the air-sea temperature differences over the water masses on either side of the sea surface thermal fronts: The boundary layer over the rolder water was 50 m lower than over the warmer gyre water, had a stable inversion layer overlaying a shallow surface layer, and had a greater concentration of smaller-sized nerosols. Aerosol populations over the Alboran Sea (gathered by ship) were characterized by large di-urnal variations in concentration, size, and chemical composition. On the average, sub-micron sized particle concentrations were apmicron sized particle concentrations were approximately 50% greater over the rolder water (probably trapped in the low level inversion), while concentrations of particles >1 micron were comparable in both areas. Wave data inferred from aircraft photography also showed smaller wave heights in the colder water. The rorrelations of these atmospheric parameters with oceanographic features can both romplicate interpretation of remote sensing images and offer clues to useful anal-

Internal Wavea

Nonlinear internal waves (often described as bores) have been known in the Strait of Gibrakar for decades. For the first time, however, our data show that these eastward-propagating waves often furm ordered groups of short period (about 30 min) waves in the Albornet Sea, apparently as internal solitons [Os-borne and Burch, 1980]. These waves have sufheient amplitude (exceeding 50 cm/s in eastward relocity) to affect measurement programs and perhaps directly influence larger scale dynamics as well. The waves were common, forming during most semidiurnal tidal cycles but with varying strength.

Hydrographic observations in the Gulf of

Gulf of Cadiz

Cadiz showed Atlantic water near the Spanish coast flowing eastward toward the strait. The Mediterranean oullfow appeared to move down five submanne canyons along the Iberian slope, mixing with the surrounding waters. There were several gyres or eddies in the dynamic topographies, including an anti-cyclonic gyre (near 36"20'N and 7°10'W) that has been detected in CZCS images. Velocity profiling south of Cape St. Vincent (extreme southwestern Portugal) indicated that the Mediterranean water was moving at speeds of less than 10 cm/s. In these data and companion CTD data, the temperature and salinity at the core of the Mediterranean water fluctuated as much as 1°C and 0.2 over either distances of a few kilometers or periods of a few days (spatial and temporal fluctuations on these scales could not be separated because of

Numerical Modeling

Reduced gravity models (single active layer above a quiescent lower layer) used by Preller and Hurlburt [1982] demonstrated the importance of both the magnitude and direction of the inflowing Atlantic water in the determination of the gyre dimensions. Inflow directed north of east, and thus conforming to the onentation of the Strait of Glbraltar, enlarged the nordi-south extent of the gyre. Increasing the magnitude of the inflow intensified the gyre and shifted it farther east.

When a westward flowing lower layer was included, the importance of the or pography became apparent. In cases of large inflows (>1.7 x 10^a m³/s) with an initial northward component, the submarine ridge system near Alboran Island deflected the flow northward. This deflection eliminated the anticyclonic gyre west of the Island. Smaller inflows, such as the 1.4 x 10⁶ m⁵/s esdmared for October, resulted in a large and eyclonic gyre west of the island (Figure 5).

Deep and Intermediate Water

Hydrographic sections showed that the Deep and the Intermediate Water took separate paths through the Alboran Sea. The Deep Water flowed as a narrow (20 km) current against the base of the Moroccan continental slope and then appeared at the eastern end of the strait along the southern side, much as predicted by Bryden and Stommel [1982]. The Intermediate Water, however, appeared to flow preferentially in the north ern two thirds of the Alboran Sea, arriving at the eastern end of the strait along the northern side. The Deep Water flow was thus anti-cyclonic, like the shallow Adantic water gyre, while the Intermediate Water flow was cy-

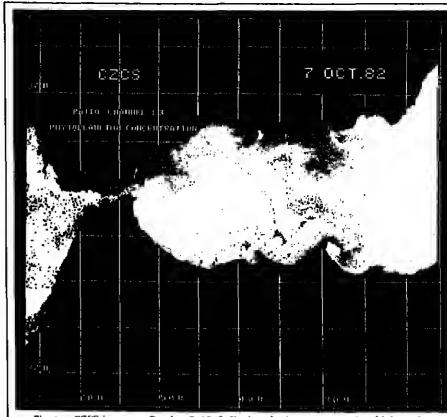


Fig. 4. CZCS image on October 7, 1982. Darker shades correspond to higher phytoplankton pigment roucentrations (cf. coverl.

clonic. Two-layer numerical model experiments suggested that this pattern resulted from the influence of rotation on the Intermediate Water and of bathymetry on the

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Oceanography (cont. on p. 684)

INTERFACE DEVIATION ZL IS-V DAY= 360 DH= 4.0 M 280 (KM)

Pycnocline anomaly for a steady state two-layer model experiment. Upper layer nflow was 30 cm/s angled 21° north of east, and lower layer inflow was a uniform 0.2 cm/s across the eastern boundary. Positive contours dennte a thickening of the upper layer (con-

A Global Ocean Flux Study

John H. Steele

A major goal for oceanography in the next decade is an understanding of ocean dynamics at hasin and global spatial scales and at time scales from the interannual through the decadal. This understanding is not only ut intrinsic interest and importance for the oceans themselves but ia an essential component of the larger problems concerning the cycles ul heat, water, and chemical constituents through the land, air, and sea. To the extent that the occans act as the "flywheel" for the tatal system at these longer time scales, our level of understanding of this companent is

likely to be critical. The larger concerns are expressed in general national and international programs, such as the "global habitability" concept or the International Geosphere-Biosphere Pru-gram (Ecs, February 21, 1984). The essential foundation for such biugeochemical concepts is a knowledge of the physical dynamics. The Glubal Atmospheric Resenreh Program [GARP) and, more recently, the Warhl Climate Research Program and its occanographic components, Tropical Ocean: Glubal Atmusphere (TOGA) and the proposed World Ocean Circulation Experiment (WOCE), are ained at providing the necessary knowledge of the zern-urder (steady state) and first-order variability of the ocean-atmosphere sys-

The critical next step is to consider how we may link these physical studies to an emerg-ing understanding of chemical fluxes within ain) through the ocean, particularly as they determine and are determined by lang-term biological cycles and treuds. The basic distribution of critical eliemical constituents is observed in two major programs, GEOSECS and TTO (fransient Tracers in the Ocean). Follow-up programs are expected in continue through the next 5 years. To link these observations to the physical rigidanics and to the biological processes, measurements are needed of fluxes of soluble and practiculate phases and ul the rates of translatination between these phases.

In the last few years there has been consid-

erable and rapid development of methods for the measurement of these rates. The use of sediment traps has revolutionized our picture of particulate transport rates in the deep ocean. A reevaluation of near turface production is in progress. Satellite color observations provide the potential for large-scale synoptic data. Deployments of benthie chambers at the theen ocean bottom can now measure fluxes through this boundary. Exchanges across the coastal/ocean boundary are being studied intensively, as are questions of lateral transports to the ocean interior. It is recognized that there is need for further development of these methods, but, taken together, they provide for the first time the possibility to put numbers to many, if not all, of the critical rate processes.

Can these new techniques, combined with the peograms of physical and chemical obser-

vations, provide a picture of the basic longterm chemical/biological dynamics at the ba-siti or global space scales? Can we envisage a coherent program of development and de-ployment over the next 5-10 years? Do we have the conceptual basis, possibly expressed through numerical modeling, to explare the size and nature of such a program?

It is timely to cumulater these questions in the context of developments within the fields of chemical and binlogical oceanography and also in relation to the programs far study of the physical dynamica. There need to be close links between such programs, but the methods for, and interests in the nonconservative tracera requires ari independent approach.

Preliminary discussions had identified several key topics where concepts and technologies need to be evaluated: (1) sediment traps and large volume sampling methods; (2) production cycles and satellite observations; (8) exchanges across the benthic boundary, including shelf/ocean transports; (4) modeling simulations as planning tools; and (5) relation with existing physical and chemical programs (WOCE, TTO)

A meeting of experts in these areas was called by the Board on Ocean Scienre and Policy of the National Research Council to conalder the feasibility of developing a program that would provide a coherent framework for jaint studies and which could lead to a major field effort in the next 5-10 years. This meeting was held on February 14-16, 1984, in Washington, D. C.

The meeting discussed the topics and techniques listed alarve. The group also discussed fully the relation between a "flux" program and existing or proposed programs such as TTO and WHCE. In particular, it was recogirized that theoretical and manierical model ing studies could be used to link the physical ilynamics with the chemical and biological processes. Work ia required on the models that may be most appropriate for thu pur-

Front a general review of the present range of programs such as those measuring tracers (e.g., TTO), the varied studies using sediment traps (e.g., Sediment Trap Intercom-parison Experiment and Vertical Transport and Exchange Experiment), and benthic flux work (e.g., Manganese Nudule Program), one major conclusion emerged. We need to study uni only vertical but also horizoutal transport of major "particle-reactive" components on space scales of basin or global dimension and on time scales from the interantual through decadal. Thus any coherent program must ains to view these interactions at the larger

A second major conclusion was duat, although existing analytical and snutpling techniques have the potential to provide answers on the appropriate scales, there is a significant prior need to test the capability of some tecliniques for larger scale use and, especially, to have a better understanding of the pro-cesses, physical, chemical, and biological, which drive the system at certain critical locations. Thus, a larger coherent program is envisioned for a time frame probably starting no earlier than 1990, but planning for this must be closely linked to a set of intermediate

objectives and field programs.
The following scientific objectives were proposed: (1) to define the rate of produc-tion of organic matter as a function of geo-

raphic lacation and time; (2) to define the rates of organic matter from the photic zone into the ocean interior as a function of location and time; (3) to define the transfer rates (by respiration, dissolution, and sorpuani between pliases as a function of time and location within the water column; and [4] to define the ratea of flux between the ocean interior and the seafloor. It was agreed that

certain immediate steps were needed as a buildup toward a fully developed program.

1. Remote Sensing: Satellite color images wauld provide essential data to cover the range of space and time scales envisaged for ocean basin ar global studies. Recent reports demonstrate the ability to use these data for estimates of primary production. Thus, the group strongly supported the proposed OCI (Ocean Color Imager) and the need to have it introduced into the next budget cycle so that the satelbie may be in orbit for a time period overlapping the altimeter and scatterometer flights (approximately 1990-1995).

At the same time, the group realized the need to demonstrate the specific uses for OGI data in the larger-scale context (the major achievements using color data have been for mesoscale studies). Thus, a thorough study is required of existing data to deter-mine the statistics of (1] data availability by geographic location and season (the problem of cloud cover) at the basin scale; (2) data variability as a function of location and space and time scales; and (3) die mean values for use in productivity calculations.

2. New and Recycled Production in the Photic Zone: There is a significant discrepancy between direct (short-term, "bottle"| nieasurements of primary production in the photic zones and indirect (long-term field data) estimates derived from combining chemical and physical measurements. The differences (involving factors of 2-5) may be due in part to semantics (what is "production," what is "new" and "recycled"); or to great differences in space and time scales (bottle versus B-spirall: but there is still sufficient divergence that must be eliminated or resolved before this computent of a global flux study haa a

3. Integrated Process Studies: The development of sediment trap technology has led to an outburst of activity in different regiona and in relation to a wide range of problems from near surface fallout to lithogenic transports. The diversity of use demonstrates the versatility of this technique, and these uses should custinue. At the same time, for studies of the overall cycles in larger ocean regions, we need some integration of trap techniques, of sample analyses and of other methods (e.g., production: benthie chambers) to be used in close conjunction with trap deploy-

Given the consenaus of a capability to carry out a major program on ocean fluxes, combined with the need to prepare for this by several immediate actions, the group proposed the following goals.

I. To determine whether we have the potential to obtain ocean data on a global scale that could profoundly change our understanding of the flux of critical chemical con-

2. To identify the immediate and long-term objectives needed to achieve the Global Ocean Flux Program.

3. If the ability is achievable, to determine

the U.S. role in such an international pro-4. To specify the inmediate steps neces-

sary to assure that an appropriate program can be conducted within the next decade. To meet these goals, the group proposed there should be a 5-day workshop with 40 participants, which is tentatively scheduled to be held in Woods Hole during September 1984. It is to be chaired by Ken Binland. Any questions ur comments should be addressed to Dr. Kenneth W. Bruland, Associate Professor, Division of Natural Sciences, Applied Science Building, University of California, Santa Gruz, Sama Čruz, CA 95064.

This article was written by John H. Steele, Convenor, February 14-16, 1984, Workshop, He is with the Woods Hole Oceanographic Institution, Woods Hole, AlA 02543.

Meetings

NATO Advanced Study Institute

The NATO Advanced Study Institute (ASI) will present lectures on modern numerical methods and physical parameterization for ocean circulation modeling for develaping physical understanding. The models will encompass a broad range of subjects, including storm surge, mixed layer, eddy-revalving, quasi-geostrophic, primitive equation, and di-

The ASI will be held in Banyuls-sur-mer. France, from June 2-15, 1985. The director is James J. O'Brien, The Florida State University, Tallahassee, FL 32306. The French organizer and codirector is Michel Crépon, Lab. d'Océanographie Physique, Museum Na-tional d'Histoire Naturelle, Paris, France. Principal lecturers are Alan Davier, U.K.; François Ronday, Belgium; Bert Seutner, United States; Mark Cane, United States; David Anderson, U.K.; and Lars Petter Roed, Norway. Several other lecturers will be selected in the near future. Bernard Saint-Guily is the local host.

Forty-five students from NATO countries will be chosen to attend the ASI. These people should be advanced graduate students, recent Ph.D.'s and research assistants with an interest to learn physical oceanographic numerical mudeling. Persons who wish to attend as a student should send a curriculum riae and one or two references from professors in their country to Dr. O'Brien or Dr. Crépon by November 1, 1984.

All interested scientists are encouraged to apply to be a lecturer at the ASI. However, space is limited. A letter indicating the content of your lectures should be sent to Dr. O'Brien by October 1, 1984. From the applications, invitations will be issued to speakers. Lecturers are expected to attend for a minimuu of I week.

Limited travel money is available from NATO to support participants. Additional travel money is being sought from NATO member countries. All applicants should indicate their requirements for travel funds. French participants should contact Dr. Crepon, Paris. All other participants should con-

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Armar mass spectrometry. Candidates must be thoroughly grounded in the fundamentals of isotope studies (stable and radingenic) and their application in earth science, and

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Applicants should send resume and names of three referees to Robert A. Phinney, Chairman, Department of Geological and Geophysical Sciences, Princeton University, Princeton, N.J. 08544,

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invites applications from resesrehers active in the fields of marine geology and geophysics to fill available positions on the scientific staff of the Department of Geology and Geophysics. We seek applicanis at a broad range of experience lovels, from Immedialely post-doctoral to those with 10 or more years of research

Protessor Albert T. Haui Department of Geology University of Illinois al Urbana-Champaign 1301 W. Green Street Urbana, Illinois 61801 Telephone: 217-333-7732 or 333-3548 University of Ullinois Is an equal opportunity/affirmative action entology. mative action employer

University of Teass at Augin. The Department of Geological Sciences seeks to fill tenure track posi-dons effective fall 1985 in one or more of the foldons effective fall 1985 in one or more of the fol-lowing disciplines: 1] micropalesmology-Treirary bioatratigraphy, 2] structure-lectories, 3) hydrogeul-ogy, and 4] minecalogy-kinetics. Each person is ex-pected to teach both undergraduate and graduate courses and to conduct a vigorous research pro-gram, including the supervision of graduate stu-dents, in the area of his or her speciality. The posi-tions require the Ph.D. elegree. Applicants should submit a detailed resume, names and addresses of five references, a statement of teaching and re-search interest, and a tupy of their dissertation al-stract by December 1, 1984 no. Dr. tVilliam L. Fish-er, Department of tienlogical Sciences, the Universier, Department of Genlogical Sciences, the Univer ly of Texas at Austin, Austin, Texas 78713–7909. The University is an equal opportunity/affirma-

Stanford University/Plasma Physics, EM Waves, Space Physics. We are seeking a senior person who has demonstrated scientific, managerial, and leadership qualifications in one or more of the inlowing disciplines; Space Plasma Physics, electromagnetic waves, and solar-terrestrial physics. We expect the successful candidate to have established an onistanding reputation documentable through professional writings of other evidence of personal technical creativity, letters of reference from recognized research leaders to the disciplines membated above, and/or awards and other recognition from appropriate professional switches.

above, and/or awards and other recognitions from apprenpriate professional societies.

It is expected that this individual will develop a research program to one of the disciplines given above working or conduction with ongoing programs within the STAR Laboratory and, possibly, with other activities within the Stauford Centra for Space Science and Astrophysics. It is expected that this individual will have a strong background in experimental techniques, either in the laboratory or in the held, including the enchannient of space; experimental artivities in either laboratory or space plasma physics would be regarded as good qualifications. However, close association with discoretical developments in plasma physics and/or electromagnetic through the carts he described to also exposed that the individual will have a demonstrated capabilitation. in the one will dearth be described. It is also expected that the roductional will have a demonstrated capability for securing federal or other rerearch grant support, or be deemed by the selection committee of being capable of securing such funds.

It is anticipated that the person chosen will devote the najor part of his or her time to research activities. However, there is an opportunity for participation.

the nisjor part of his or her time to research activities. However, there is an Opportunity far participation in academic responsibilities of Electrical Engineering Department, including, when time permits teaching graduate and undergraduate classes, serving on various committees of the department, School of Engineering, and the University. It is expected that the person chosen will participate actively in the training of graduate students.

The Chairman of the selection committee for this position is Professor Robert A. Helliwell, Professor of Electrical Engineering, Space, Telecommunications, and Radioscience Laboratory, Stanford University, Stanford, GA 94305, Other members of the selection committee include Professor P.M. Banks, Professor R.N. Bracewell, Professor L.R.O. Storey, and Professor L. Tyler.

Project Associate/Specialist: Electron Miero-Probe Lab, University of Wisconsin-Madison. Strong analytical background in quantitative EMP analysis and familiarity with computers is required. The Lab has a 9-specific meter ARL SEMQ and a JEOLCO 50-A SEM. Dudes will include instrument maintenance, instruction of students, development of procedures and analysis. Research will be encouraged. A MS or PhD is required in Earth Science, Chemistry, Physics or Engineering. Minimum salary will be \$18,000/12 months with an MS. Send letter of application, transcripts, resume, and names and addresses of three references by September 15 to Dr. John W. Valley, Department of Geology & Geophysics, Weeks Hall, University of Wisconsin, Madison, WI 53706.

An equal opportunity employer

Setellite Geodesist. The scientific staff position available | October | 1984 at the Massachusetts Instisatellite Godesia. In exclanate stain postum wallable I October 1984 at the Massachusetts Instinite of Technology, Department of Earth, Atmospharic, and Planetary Sciences, in a federally aponsored long-term program of research in geodesy via radio Interferometry with Global Positloning System [GPS] satellites. Candidates must have Ph.D. in geodesy, and ability and experience in radio interferometry with satellites, as demonstrated by substantial publications and reference reports. Expertise in FORTRAN scientific programming, in statutics, in the theory of satellite geodesy, and in parameter estimation techniques applicable to large, multi-parameter geodetic problems is essential. Experience in performing field work and in data processing ou large IBM mainfrante and/or small PDP-11 camputer systems would be helpful, as would knuwledge of the GPS, geodetic reference systems, and network adjustments. Strong skills in oral and written presentation of research results are required.

Please send vita, including list of publications, salary requirements, and references, plus reprints of major publications to:
Professor Charles C. Counselman, 111

Co L.M. Birchotte

do L.M. Birchette Personnel Office, E19-238

M.I. I. Cambridge, MA 02139 MIT is an affirmative action/equal opportunity

Geophyalelst/University of North Carolina. The Department of Geology invites applications for a senire track faculty position in solid-earth geophysics beginning July 1, 1985. The position probably will be at the assistant professor level, but cantidates at the assistant professor level will be considered.

RESEARCH **POSITIONS** IN MARINE **GEOLOGY AND GEOPHYSICS**

exporienco. Salary levels nogotlable, depending primarily on background and experience. The Institution offers excellent facilities to carry out the full spectrum af practical and theoretical marine ourth scionce research. A strong interest by candidates In conducting programs af marino G&C data acquisition and analysis is preferred: a capability to conceive, fund and carry aut Independent research programs is required. In addition to Geology and Goophysics, the Institution consists of 4 well-established research dopartments specializing in the fields of Biology, Chomistry, Physical Oceanography and Ocean Enginoering. Gollaborativo research with members of the staff of those departmenta is strongly encouraged. Opportunities also exist for participation

Applicanta should send resumes and names of 3 professional references to: Personnel Manager Box 54 P

in the jaint Massachusetts Instituto of

Technalagy - Woods Hole Oceanagraphic

Inalitution graduato level education



OCEANOGRAPHIC INSTITUTION Woods Hole, MA 02543 An equal opportunity employer M. P. IL

ered. The Ph.D. is required, and past-charged experience is derited. Our preference is for a sels-infolgist and/or tectomphysicist, who would complement rurrent departmental activities, but any good applicant in geophysics will be considered.

Faculty members are expected to conduct a visible and active recarch program, teach graduate atol nudergraduate students, and supervise theses. Inquiries and letters of application should be sent to P. Geoffrey Feiss, Department of Geology 029A. University of North Carolina, Chapel Hill, NC 27514. Applications must include resume, natement of tesearch and leaching interests, and the names of at least three referencer. Glosing date lar applications is October 19, 1984.

UNG is an affirmative action/equal opportunity

UNG is an affirmative action/equal opportunity

Physical Oceanographer/Ocean Englacer. Evans-Hamilton Inc., an oceanographic consulting firm in Washington, D.C. area, has an a pending for a physical oceanographer/ocean engineer at the MS or PhD level. Emphasis u in numerical modeling of wind, wave, tidea, and currents in estuary and on the shelf and also on solving related coastal engineering problems. Some experience in data aquisition and/or analysis is desirable. Salary is apen. Company provides medical and profit shading plana. Send resume to: Douglas J. Evans, Evana-Hamilton Inc., 354 Hungerford Dove, Rockville, MD 20850 or call 301-782-8070.

Soil Scientish Career Federal Service. The Agricultural Research Service U. S. Salinity Laborotory, in Riverside, California, has a position available far a scientist interested in conducting theoretical research on the transport of water and dissolved aubstances through soils. Research should result in a act of models that describe the behavior of salts and water in soil systems. Altust have knawledge uf advanced soil physica, soil chemistry, and roil-waterplant relations. Salary based an qualifications and expecience, GS-1/1/2/13, \$25,489/\$36,327. Applicants must be U.S. citizens. Fur application procedures call Rita Millard in Beltsville, Maryland, On 501-344-3138.

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Cooperative Institute for Gliman Studies/Announcement of Pontdoctoral Fellowalds. The Department of Metearology at the University of Maryland, College Park has established the Cooperative Institute for Climate Studies (CICS) with NOAA to engage in collaborative research. The Institute is involved in a variety of studies ociented toward a better understanding of climate and currently has an opening for a postdoctoral fellow to Join the current institute stuff in the area of ateady state climate modeling. This pusition calls for a meteorologist with experience or interest in experiments will steady state climate models. Principal activities will involve running experiments with existing steady state models, deriving careful verification procedures, handling extensive observed data sets, unaking modifications in model physics and forcing, and devising more efficient computational schemes for models.

running the models.

Letters of application should be sent to: F. Baer,
Director, CICS, Department of Meteorology, University of Maryland, College Park, MD 20742. Applications should include a curriculum vitae and names of three references. Applications received before October 13, 1984 will receive full considerables.

allan.
The University of Maryland subscribes to a policy of equal educational and employment opportunity. The University of Maryland, under Title IX of the Education Amendment of 1972, does not discriminate on the balls of sex in admission, treatment of udems or employment,

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RATES PER LINE

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54-

Positions Available, Services, Supplies, Courses, and Assouncements: first insection \$5.00, additional insertions \$4.25. Positions Wanted: first insertion \$2.00. addition-

al insertionr \$1.50 Student Opportunities: first insertion free, additional intertions \$2.00. There are no discounts or commissions on

classified ads. Any type rigle that is not publish er's choice is charged at general advertising rates. Est is published weekly on Tuesday. Ads must be received in writing by Monday. I week prior in the date of publication.

Replies to ads with box numbers should be adriressed to Box American Geophysical Union, 2000 Flutria Avenue, N.W., Washing-

For newe information, call 202-462-6903 ar toll free 800-424-2488.

POSITIONS AVAILABLE

684

Department Head of Plant Sciences/University of Nevada Reno. The College of Agriculture, University of Nevada Reno, it seeking applicants for this twelve-month senure track position. The Department has mineteen faculty and conducts teaching, research and extension programs in the areas of agronomy, horsiculture and integrated pest management. A Ph.D. In a plant science related discipline and evidence of administrative and leadership abilities are required. Clusing date for applicationals October 15, 1984. The position is available January 1, 1985. Cuntart Dr. Elwood Miller, Chalrman, College of Agriculture, UNR, Reno, NV 89557—0004, 7112-784-66111.

The University of Nevada Reno is an equal opportunity employer.

American Museum of Natural History. The Department of Mineral Science is accking to fill a tenure track position for Arstaant Curatur beginning July 1985. This is mainly a research position, but some time u accded for collections management

and departmental activities. High quality sample oriented research and publication is the poime responsibility. The field of specialization is mineralogy,
broadly defined, and may include and combine aspects of petrologie mineralogy, ore mineralogy,
min eral geochenistry, crystal and thermochemistry,
mineral physics, X-ray crystallography, ultrastructure analysis, crystal growth, spectroscopy or gemology. Major research facilities include a fully automated ARLSEMO electron microprobe, X-ray laboratory, minicomputer, and vast mineral and other
collections. The opportunity exits for research and/
or teaching collaboration with nearby institutions
such as Columbia [Lamont-Doherty Geological Observatory).

auch as Columbia [Lamont-Doherty Geological Ob-servatory).

Requirements are a Ph.D. in hand by the time of appointment and an ability to carry aut a research pringram. It is expected that some research support will be sought outside the Museum. Applications should include: [1] a curriculum vitae, (2] names of three persons familiar with your work, and [3] a statement of research interests and specific projects in be carried out within the next live years.

These must be aribmitted by November 15, 1984 in:

Alartin Prinz
Chairman, Search Committee
Department of Alineral Sciences
American Muscum of Natural History
New York, NY 10024
An equal opportunity [hVF/H] affirmative action

Scripps Institution of Oceanography/Marine Geophysics. The Scripps Institution of Oceanography
invites applications for a tenure track position in
solid-earth geophysics/tectonophysics. The level of
the appointment will depend on the applicant's
qualifications. Candidates will be expected to supervise and conduct research to geophysical studies or
tectonophysics with emphasis on the ocean basins
and their margins. The position will also involve
graduate level teaching and the supervision of graduale student research. Applicants must hold Ph.D.
degree and have demonstrated excellence and independence in research in geophysics-tectonophysics.
Associate or Professorial level candidates must show
evidence all itting research record in their specialization; Assistant level candidates will be expected to
show evidence of their potential through publication
record appropriate, for their experience and letters
of recomatendation. Send letter of application in-

cluding description of research interests, but of publications, returne of teaching experience, and names of at least three references to: Chaimsin, Graduate Department, A-008, Scripps Institution of Oceanography, University of California, San Diego, La Jolfs, CA 92095. Closing date for applications is 15 October 1984. We expect to fill the position in calendar year 1985.

An Equal Opportunity/Affirmative Action Employer. Women and minorities are especially invited to apply.

Senior Level Hydrogeologiai. Requirements: M.S. + 5 years experience as Project Manager. Computer modeling and writing skills imperadre, Strong background in applied hydrogeology integrated with chemistry and engineeding destrable.

Remaneration: Commensurate with experience plus excellent benefits and growth potential.

Respond: In confidence atailing interest, full resume, references and salary history to Mrs. V.L. Borsos, R.E. Wright Associates, Inc., 3240 Schoolhouse Road, Middletawn, PA 17057.

DIRECTOR HYDROGEOLOGY DIVISION

Leighton and Associates, Inc., a rapidly growing Geotechnical Consulting Firm based in Southern California, has an opening for a Director to head its Hydrogeology Division. An MS degree in Hydrogoology from a major university and minimum 10 years industry experience, or a Ph.D. with a minimum 5 years industry experience ot equivalent level of academic exporience with publications is required. Responsibilities include:

 Development of innovative solutions to ground-water problems; Preparation of successful proposals for major regional projects; Management of field-oriented ground-water evaluation programs;

Byaluation of hazardous waste contamination and cleanup procedures.

Supervision of ground-water modeling efforts;

Leadership and self-starting qualities, strong client cootact capabilities, excellent writing and communication skills will help qualify for this challenging position. Excellent benefits and salary commensurate with experience in a dynamic technical environment. Send resumo and salary history to: 1151 Duryes Ave., Irvine, CA 92714.

Nominations for 1985 AGU Fellows

who have all alnad acknowledged aminance in a brench of geophysics. The total number

To be considered by the Committee, nominations for Fallowship in AGU must be made

AMERICAN GEOPHYSICAL UNION

Nomination For Fellowship

Name of Sponsor

of Fellows alected each year cannot exceed 0.1% of the total mambarship.

Buainass Address (including position hald)

Education (degreas, Institutions, mejor flaid)

Allach a list of most significent publications (not abstracts, book reviaws, or papers

Allach a supporting statement which must include: (1) sn indication of the langth and

nature of your acquaintance with the nominae; (2) tha nominee's contributions to the lleid io data; (3) your aveluation of the nominea's scientific ability; (4) a one-line citetion,

"For ", summarizing why the nominee should be elected a Fellow.

Sponsor's Tilla and Affiliation _____

Send nominetions for lorwarding to your designated Section Salection Committee to:

Prolessionel Record (including spaciel honors) _____

on tha form below. Il more speca le naedad, atlach a separate sheel.

Nama of Nominee

Perapnal Data on Nominee

Dete and Place of Birth _____

Mambarship in Othar Sciantific Organizations ____

that have not yat bean accepted for publication).

Sponadr's Evaluation of Nominae

For a list of current Fallows, write AGU.

AGU Member Programa

2000 Floride Avenue, N.W.

Washington, DC 20009

Nominalions for Fallowship in the Union are being sought by the Fallows Committee and the Section Salection committaes. Nominaas for Fellowship should be aciantists

RESEARCH PHYSICIST, GM-13/14 ASTROPHYSICIST, OR 15/14 155,807 **GEOPHYSICIST**

The Spectroscopy Section of the Solar Physics Bianch, Space Science Division is enjaged in ultraviolet solar research by means of ground-based observations. sounding tockets, and manned and unmanned

We invite applications for the position of Project Scientist for a major satellite experiment which will fly on the Upper Atmospheric Research Satellite. The selectee will conduct investigations to develop the technical tools necessary to study the variability of the Sun in the ultraviolet spectium. He/She will be a co-investigator of the NRL-UARS experiment. In this capacity the selectee will conduct his/her own research in the area of solar variability and/or upper earth atmospheric physics

Qualifications required. A bachelors or higher degree in physics and at least three years of professional expenence which involved performing basic and/or applied research in the fields of optics, spectroscopy, solar physics, or geophysics.

Interested applicants should submit a Personal Qualifications Statement (SF-t7t) or detailed resume by 28 September 1984 to:

(Salary dependent upon qualifications)

SPECTROSCOPY SECTION SOLAR PHYSICS

BRANCH SPACE SCIENCE DIVISION

NRL NAVAL

RESEARCH LABORATORY Civilian Personnel Division

Ann 41-58-13 | IEOS) 455S Overlook Avenue, SW Washington, D.C. 20375

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Faculty Position/University of Missouri-Columbia.

The University of Missouri-Columbia in vices applications for a tenure trask position to begin in August of 1985. Applicants will be expected in have completed requisessents for the Ph.D. degree by that time. Appointment is expected to be made at the Assistant Professor level, but exceptional cases might be runsidered at higher rank. Faculty members are required to provide quality instruction at both undergraduate and graduate evels, and conduct research leading to scholarly publications. The following fields will be runsidered:

Hidrogology — preference will be given to a per-

History of the strength of the

water remurces.

Solid-rath geophysics (to complement two seismulogists joining our staff in January 1985) — preference will be given to a person with research interest in heat flow, potential fields, or geophysical mudel-

ing.
Applicants should send resiline, transcripts, and names and addresses of three references to:
Tom Freeman, Chairman
Department of Geology
University of Missouri
Columbia, MO 65211.

Harvard University/Faculty Poaltion to Petrology.

The Department of Ceological Sciences, Harvard University, invites applications for a faculty position in petrolagy. We are interested in persons concerned with the mineralagy and the major and/or trace element ehemistry of metamorphic and igneous rocks in relation to their geologic and tectonic setting. Experience with modern methods for the study of natural rocks, both in laboratory and in the field, it essential. The successful applicant must have the Ph.D. degree and demonstrated capabilities to conduct original research and to teach both undergraduate and graduate students. The appointment will be made at the Assistant or Associate Professor level depending on qualifications and experiessor level depending on qualifications and experiessor. ment will be made at the Assistant or Associate Professor level depending on qualifirations and experience. The 1984/85 salsry ranges are \$28,600—\$28,200 for Assistant Professor and \$30,600—\$35,600 for Associate Professor. Appointments are made for an initial term of up to live years. Interested applicants ahould send vita, bibliography, and names of three references to:

Professor Adam M. Daiewonski

Professor Adam M. Dziewonski
Harvard University
Hoffman Laboratory
20 Oxford Street
Cambridge, MA 02158
Harvard University is an equal opportunity/aftrmative action employer. Women and minorities are
encouraged to amply.

Faculty Positioos/Univaraity of Colorado, Denver.
The Physics Oepan ment of the University of colorado at Denver roay be recruiting for several tenure track faculty positions to begin in the Fall Semester of 1985. We are especially interested in applicants for appointments at the level of Assistant Professor; however, we will also consider senior appointment for appropriately qualified applicants. The teaching assignment is anticipated to be a total of three courses per academic year, including involvement in the undergraduate laboratory program. A record of scholstly publications in ceferred journals will be required for advancemem.

A successful candidate will be expected to provide high quality teaching over a broad range of under-

high quality teaching over a broad range of under-graduste physics courses to students who are highly motivated, and, because of our urban environment. motivated, and, because of our urban environment, somcwhat older than the average college student. In addition, our department is developing a research program to support graduate instruction primarily at the M.A. and M.S. degree level. We are looking for physicists with research conspetence in one of the following areas: geophysics, environmental science, applied solar energy, or two-linear phenamena. Applicants should be willing to play a role in the development of a strong physics department supportive of related disciplines such as gestlogy, engineering, chemistry, and mathematics. development of a strong physics department sup-portile of related disciplines such as geology, engi-neering, chemistry, and mathematics.

If you would like to apply to join our faculty, please see that we receive a letter af application, a current resume, and three letters of recommendation. Applications are the second control of the commendation of the commenda current resume, and three letters in recommendation. Applications must be postmarked before 15
Occember, 1984. Please note that you are responsible for having the letters of recommendation sent to
us. Please send applications or linguisher to:
Willard Chappell
Department of Physics
Division of Natural and Physical Sciences
1 100 Fonteenth Street
Denver, Colorado 80202.
The University of Colurado is an equal opportunityfaffirmative action employer.

sative action employer. The University of Kansas/Faculty Positions. The University of Ransas, Department of Geology seeks to fill three tens re truck positions at the Assistant Professor level to begin in Fall, 1985. The Department seeks persons committed to scademic careers involving teaching, cesearch, and service. Salaries will be determined by qualifications and experience and will be competitive. Candidates should hold tho

Ph.D. tiegree in Geological Sciences ur have it near

on pleion.

All positions carry responsibility for teaching at both indergraduate and graduate level, conducting active programs of research and publication, and superviving the cesearch of students. Candidates should expect to teach introductory courses as well as in their specialties. The Oepaninent may give preference in those who are qualified physically and but calculate on expensions to teach in a supervision of the control of the

preference in those who are qualified physically and by training or experience to teach in our summer field programs and have the capability to use the computer to solve geological problems.

Position t. Sedimentation, with interests in the interface between sedimentary processes and stratigraphy, diagenesis and low-temperature geochemistry, or tectonics. Duties will include teaching courses in stratigraphy, sedimentation, sedimentary geuchemistry, or tectunics.

Position 2. Terroples, with interest in the interface between tectanic more seen and sedimentation, inne-

Position 2. Territories, with interest in the interfare between tectanic processes and sedimentation, igneous phenomena, or metamurphism. Outics will include teaching courses in structual geology and tectonics ar petrology. Candidates with field prientation will be preferred.

Position 3. Geophysics, with interests in seismology, crustal structure, ar potential fields. Candidates should expect to interact with a strong group in the Kansas State Geological Survey and coordinate the academic aspects of the program in geophysics, crustal structure, or tectonics.

Applicant should send a resume, academic transeripts, and at least three letters of recommendation to: M.E. Bickford, Chairman of Search Committee, Oepartment of Geology, University of Kansas, Lawrence, Kansas 66045—2124. Application materials must be received by 5:00 p.m. November 19, 1984. The positions ace contingent upon availability of funds.

The University of Kansos is an AA/EEO emplayer and encourages applications from all qualified per-

Department of Geology and Geophysica/Uolversity of California, Berkeley. Subject to final budgetary approval, the Department is authorized to make two faculty appointment, one at the senior level and one at the junior level, and antiopates making two further appointments next year. Applicants with an outuanding record of research in any field of geology and geophysics are encouraged to apply. The ability to carry out leading research, as well as an interest in teaching graduate and undergraduste students, are major factors in the selection. Applications, including the names of ar least three reference, should be sent by Oecember 15, 1984 to the Search Committee, Department of Geology and Geophysics, University of California, Serkeley, California 94720.

The University of California is an equal opportunity.

rnis 94/20.

The University of California is an equal opponu-lty/affirmative action employer.

Postdactoral Research Position/Petrology-Geoebemistry: Northern Illinois Uolversity, Departmant of Geology. Recent Ph.O. recipient is saught
for one year position starting in early 1985. Strong
analytical background in XRF or plasma spectrometry is preferred. The Department of Geology is in
the process of acquicing new, autamated XRF and
DC plasma spectrometers. The successful candidate
will be involved in the development af sample-preparathoo, analy: "al, and data-reduction procedures,
as well as instructian of other users. Independent or
collsborative research will be expected. The Department also has solid- and gas-source mass
spectrometers, automated EMP, and excellent computing facilities. Please send application, resume and the names of three references ta J.H. Serg.
Department of Geology, Northern Illinais University,
DeKalb, IL 6011S. Application deatiline is October

Northern Illinois University is an affirmative acequal opportunity employer.

Acadesole Administrator/Assistant ar Associate Research Oceanographer. The Center for Coastal Studies, Scripps Institution of Oceanography has an opening for a split-position-50% Academic Administrator/50% Assistant/Associate Research Oceanography

Istrator/50% A sisiant/Associate Research Oceanographer.

The Center conducts a wide variety of field, isboratary and theoretical work in waves, currents, shore processes, mechanics of nearstaine sediment transport, estinarine processes, cantinental shelf and marginal seas research.

The secensful candidate will have a PhD in physical oceanography or coastal sciences. The level of appointment will be determined by experience and level of independence in his/her field as evidenced by reviewed publication record in the scientific literature and research record. The ability and desire for interaction with a variety of people within and outlide the University, particularly funding agencies, are essential. Knowledge of a broad apeetrum of research areas is also essential. Some understanding of administrative issues, e.e. personnel and budgets, is essendal.

The Administrator portion of the position is permanently state-funded. The Research portion will be funded by the Center for 12-18 months to en-

able the candidate to later abtain runtract/grain funding either separately or in cooperation with other department researchers.

other department researchers.

Send resumes, including areas of research interest and list of publications, will three letters of reference by \$1 October 1984 to:

Or. Douglas L. Inman, Director
Center far Coastal Studies, A-009
Scripps Institutian af Decantography
University af Califarnia-San Diego
La Jolta, CA 92093.

UCSD is an Equal Deportunity/Affirmative Astion Employer.

Monash University, Victoria, Australiar Departroeot of Earth Sciences Caotinuing & Fixed-term 13 Yearl Lectureships/Serilar Lectureships in Geaphysics. Commencing early 1983. One position for a sciential with research expertise in any of: theoretical seismolugy, solid Earth geophysics, complysics, and one position for a sciential with temonstrated research ability in exploration schmology. Possible extension of fixed-term position to 5 years. Appaintees to establish research programmes involving industry and government support, develop an undergraduate and graduate program covering applied and theoretical geophysics, and supervise Master's and Ph.D. students. Applicants with expertise in thermomechanical motelling will find an environment with strong interest in mechanisms of deformation, fluid/rock interaction including mass transport and thermal modelling, and physical volcanology. Enquiries to Or. Ian A. Nicholis. Salary: Lecturer—\$A33,331—\$A38,847 p.a. Applications including Ref. no. 41512P, curriculum vitae including description of research and teaching interests, and three referees to the Registrar, Monash University, Clayton, Vir. 3163 Anstralia, by 1st Detober 1984. An Equal Dyponunity Entiployer.

University of Wisconsin-Milwaukee/Faculty Position in Afmaspheric Sciencea. The Atmospheric Sciences optian in the Department of Geological and Geaphysical Sciences will have a tenure track/tenured position supported by State funds at the Assitism Professor/Associate Professor level starting January. 1985. Starting salary will depend upon the candidate's experience and will be competitive with other universities. Applicants must have a Ph.D. in meteorolagy ur atmospheric sciences and the intent to pursue a career in leaching and research. We are seeking sni individual with research interests in one or more of the following specialties: micrometeorology; mesoscale meteorology and modeling; synoptic dynamics; or climate dynamics and modeling. The successful applicant will be expected to develop a strong research and graduate program in his or her area of espertise and to teach two courses 13 cr. each) per semester at the undergraduate and graduate level.

Research apponunities at UWN include satellite

Research apponunities at UWN include satellite Research apponunities at UWM include satellite meteorology, severe storm dynamics and energetics, diagnostic modeling, large-scale circulation and energetics, synaptic meteorology and numerical madeling. Research facilities include McIDAS, Great Lakes Research Facility. Urban Research Center, and a rural lield station. Interested randidates should farward their resume to: Professor N.P. Lasca, Chair, Department of Geological and Geophysical Sciences, University of Wisconsin Milwankee, P.O. Box 413, Milwankee, Wisconsin 59201, with transcripts and the names of three persons well arquainted with the applicant's background and research potential. Closing date is Octaber 31, 1984. UWM is an affirmative action/equal opportunity employer.

College of Geosciences/University of Oklahoma, Applications and nominations are invited for the position of Director of the School of Geology and Geophysics. The Director is expected to have s Ph.D. or equivalent, a strong, ongoing research program and administrative experience; Industrial experience helpful; field of geological specialization open; so begin July 1, 1985; salary to be negotiated. In 1986, the School will move into the new 300,000 sq. ft. Energy Center along with other element of the College of Ceosciences; the Oklahama Geology Survey; and the School of Petroleum and Geological Engineering and the School of Clictuical Engineeding and Materials Sciences, both from the College of Engineering.

Applications with curiculum vitae, names and addresses of three references, and/or nominations should be sent to:

ould be sent to:

Francis G. Stehli, Dean
College of Geosciences
University of Oklahoma
601 Elm Street, Room 438C
Norman, Ok 73019.

Consideration of applications will begin January

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William M. Rice University/Marine Geophysics.
The Department of Geology Invites nominations and applications for the W. Maurice Ewing Chair in Oceanography. We are seeking applicants for a new position in marine geophysics to fill this chair.
The Department of Geology has cecendy added two reflection seismologists to its faculty and is building a state-of-the-art seismic processing facility. The successful applicant will be expected to teach graduate and undergraduate courses and to develop a strong research program in his or her area of interest. Cooperation in ongoing research with other members of the Rice faculty and faculty at other Texas universities would be encouraged.
Send enquiries and applications to Dr. Albert Bally, Chairman, Department of Geology, Rice University, Houston, Texas, 77251–1892. Applications should include a detailed resume, the naroes and addresses of three references, and a statement of research interest.

research interest.
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Research Geophysicist. The U.S. Geological Survey (USGS); Office of Earthquakes, Volcanoes, and Engineering. Sranch of Seismology is sollciting interest from exceptionally well-qualified persons with either a record of demonstrated ability or outstanding potential for research in one or more areas of Sranch activity. The Branch of Seismology conducts fundamental research in the fields of carthquake.

EARTH SCIENCES

The Lamont-Doherty Geological Observatory of Columbis University invites recent Ph.D. recipients or candidates for their degree in 1985 in sny field of the earth sciences to spply for postdoctoral fellowships awarded for a period of one year (extendable to two years, in special instances) beginning in September 1985 with a stipend of \$26,000 per snnum.

Completed applications are to be returned by January 15, 1985. Application forms may be obtained by writing to the Director, Lamont-Do herty Geological Observatory, Palisades, New York 10964. Award announcements will be made on or about February 28, 1985.

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prediction, network seismology, crustal structure and volcano seismology. The Branch is particular interested in a geophysicist with expertise in the

field of seismology.

All intecested persons should submit a detailed resume of education, experience, summary of intesests and research intentions, and the appropriate ary level commensurate with experience by 5 October 1984 to:

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U.S. Geological Survey
Branch of Seismology

\$45 Middlefield Road, MS-977
Menlo Park, CA 94025.

Should a position become available in the Brasch, you will be notified of the competitive Federal employment application requirements.

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University of Utah: Structual Geology/Tectonics' Tectonophysics. The Department of Geology and Geophysics at the University of Utals seeks applications for a tenure track position in structural geology, tectonics or rectonuphysics. It is anticipated that this position will be filled as the assistant professor law to the professor by the profess gy, tectonics or rectonupliyates, it is anticipated that his position will be filled as the assistant professor level, but applications by more senior persons will be considered. The position requires a Ph.D. with emphasis in structural genlogy, regional certonia or rectonophysics. The new faculty member will have the upportunity to testch in the area of his or ber specially and may also be assigned introductory level courses. The successful candidate will be expected to establish a vigorous research program involving graduate students. The person who fills this position will join an active program in structural geology and tectonics that includes both field projects and integrated geology/geophysics ans mechanism fluid chemistry studies of structures in the western Cordillera. There is an excellent opportunity to collaborate with other faculty in structural geology, seellmentology, geophysics, geochemistry and perology. A vita, copies of publications, names af three persons that may provide references, and a letter outlining the candidate's research and teaching interests should be sent to Dr. William P. Nash, Chaiman, Department of Geology and Geophysic, Unia 84112–1185. Deadline for receipt of applications is December 31, 1984 with the appointment starting in September 1985.

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STUDENT OPPORTUNITIES

Predoctoral Research Assistantahlp in Geachemistry. Individuals are invited to apply for a research

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Oct. 8-10, 1984 18th Annual Association

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Topics to be discussed include concerns of

iors, 4220 King St., Alexandria, VA 22302.)

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house training programs, understanding how

illustrations communicate, changes in methods of making maps, and compatibility of electronic tools); managing journals and improving the journal publication process; interfacing between publishers and printers; getting reviewers to do their jnb; applying

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Nov. 30-Dec. 1, 1984 NASA/Lunar and

Mars (part of Mars: The Evolution of its Cli-

mate and Aunuspherr), Moffett Field, Calif.

Planetary Institute Warkshop on Water on

porting hazards information).

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use and development of style guides, in-

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INASA/LPI Project Office, 3803 NASA Road , Houston, TX 77058.) Indication of interest due September 15,

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assistantship in geoclicinistry leading to the Ph.D. A masters degree in sume field of geological science is desirable. Research project will involve a geochemical study of Precambrian crustal development. Applicant must be accepted in the Ph.D. program at New Mexico Tech. Research appaintment is far 12 months beginning in Janusry 1985. Applicants should send a capy of their via together with an amiline of their research interests and arrange for transcripts and three letters af recommendation be sent to Dr. Kent C. Condie, Department of Geoscience, New Mexica Institute al Mining and Technology, Socurro, NM 87801 by no later than 15 Ortober 1984.

1984. Abstracts are due October 26, 1984. This workshop will address various questions regarding the present and past water cycles on Mars, the sources and sinks for water, and die current and past bulk water con-

Australian Physical Oceanography Conference

February 10-15, 1985 Australian Physical Oceanography Conference, Hobart, Tasinania. Convenor: Eric J. Lindstrom. (Eric Lindstrom, CSIRO Murine Laboratorics, GPO Box 1538, Hobart, Tasmania, Australia, 7001; tel.: 002-20-6222.)

Those who send notice of their intent to attend the conference by September 15, 1984, will be eligible for a reduction in the registraion fee.

This biennial meeting of scientists and students interested in the physical dynamics of the oceans provides a forum for the presentation and discussion of research results. Papers and/or poster presentations in all areas of physical oceanography are encouraged. Special sessions may be organized that bring together talks of cummon interest, such as the mstralian Coastal Experiment, Bass Strait, North-West Shelf, Great Barrier Revf. Ocean Climate, Fine and Microstructure, Tides, and Nutrient Cycling. There will be a cash award of \$100 presented for the best student paper.

AGU Membership Applications

Applications for membership have been re-ceived from the following individuals. The letter after the name denotes the proposed primary section affiliation.

Regular Membere

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gerie Francis (O), James J. Frawley (GP), Zhufeng Fu (SS). Edward Gaw (O), Cinda Graubard (T), Guliekin Gunay (H), Moltanted T. Hadidi (S), Jerry Hatfield (H), James D. Hays (T), Jean Hernandez (V), Diem Ho (A), David Hoch-

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Vujiro Ogawa (T), Jon Steen Petersen (V), David M. Peterson (V), K. Ramachandran (H), D. A. Rothrock (O), Juergen Rueffer (G), Michiel M. Rutgers vd Loeff (O), Clifford Schenkel (S), Pedro Gunha Serra (H), Om P. Sharma (SS), John M. Sharp (H), Jonathan Sharp (O), Thomas J. Sokolowski (S), John S. Staras (D)

Akira Takeuchi (T), Michael C. Ten Ras (V), Vasilis P. Tritakis (SS), Kristian Tryggva-500 (S), David M. Tuck (H), Michael L. Yoorhees (H), Qinliang Wang (H), Graham J. Welr (H), Frank L. White (H), Terrie Winnen (V), Clarence Worrell (S), Bruno Zolesi (SA), Alan H. Zorn (G).

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Figuli 1T), Jim Finley 1H), Martin Freed (O), Wayne B. Gardiner 1S1, Erik B. Goodwin 1S). Marc R. Hairston [SM], Smart Henrys [S). Thomas L. Hurst (H), Douglas M. Johnston (H), Richard Kelsey (H), William S. Kessler

(O), Gregory A. Lawrence |O|, Jacqueline S. Lee (V), Saulwood Lin (V), Darryl Luce |T), Furaha N. Lugoe (G). Stephen Marks JV), Garry Manrath (V), Mark A. Meadows (S), Wendy Melgin JH), Robert H. Montgomery (H), Ronald D. Moyer (T), Susan Novak JS), Delia Oppo (O),

Douglas B. Ross (GP), Steven Ruppert 1S). Robert Schellhorn (S), Gary Shanks (H), Kwokiai Shum (O), James Edwin Smith (H), Howard A. Snyder (V), Kenjl Sone (T), A. H. Spltz (V), Daniel J. Stein IV), Catherine L. Summa (H), Cathy Jean Wilson (H), Randal T. Wortman (H), Michael H. Young (H), James Zachos 10).

Proposed Change in the AGU Bylaws

On May 15, 1984, the AGU Council gave initial approval to an amendment to Bylaw 11 diat would remove the Membership Committee as a Standing Committee. The change was recommended by the Executive Committee for three reasons:

 The functions of the committee as onginally designed (i.e., to promote and process membership) are now handled enuirey by staff. 2. The Membership Committee has func

tioned for the past several years as an oversight committee for the Union; as such, it is not correctly named, and all of the proposed activities can be covered by other committees. 3. If there is a need for some form of committee to address membership issues in

the future, it can be promptly established as a special committee. Notice of this proposed change is given in accordance with Article 12b of the Statutes, which requires that proposed amendments to the Bylaws be published in an AGU publica-tion of general circulation no less than 30 days prior to a second consideration by the Council. The Council will consider this pro-

posal for final passage at its December meet-

The Statutes and Bylaws Committee welcomes comments from the membership on the proposed change. Please send comit to Shelton S. Alexander, 403 Deike Building, Pennsylvania State University, University Park, PA 16802.

Deadlina: Septamber 17, 1984

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